FEC line rate

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FEC Overhead

- FEC requires extra parity information which may be carried by one of two means:

- Clock rate may increase for parity overhead to maintain 10Gbps MAC data rate
  - or
- MAC data rate may decrease for parity overhead to maintain 10.3125 Gbps line rate

Clock Rates

- Irrational clock rate are not good!
  - Loss of commonality to 10GE
  - Non standard SERDES rates
  - Limited supply of oscillators – must be synthesized
  - Difficult to perform lab testing
  - Example frequency for a pure RS(255,239) is 10.3125 *255/239 = 11.0028765690377 Ghz or 90.8853238268 ps (period)

Throughput

- Reduced throughput
  - Parity utilizes bandwidth that data would normally use.
  - Network congestion may occur between 10GE uplink and 10GEPON
  - Throughput is already reduced due to MPCP and OAM messages and guard bands (upstream only)
  - Efficiency of line encoding with FEC is better than 802.3ah frame encoding
  - Example of throughput with a RS(255,239) code: 10.0 Gbps * 239/255 = 9.3725Gbps

Throughput

- FEC does not create a new congestion problem
- In EPON throughput is reduced due to
  - MPCP messages
  - OAM messages
  - Discovery window (upstream only)
  - Burst-mode overhead: guard band, on/off times, sync times (upstream only)
- Parity is simply an additional overhead component
  - Efficiency of line encoding with FEC is better than 802.3ah frame encoding
  - Example of throughput with RS(255,239) code: 10.0 Gbps * 239/255 = 9.3725Gbps
- Effective MAC data rate must be reduced to accommodate various overhead components, including FEC parity overhead.

Conclusion

- The loss of throughput is a better choice as long as the overhead consumed is not excessive.

- 10GEPON needs commonality with 10GE to keep cost down.